

United States Patent and Trademark Office

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/862,755	05/21/2001	Ye Li	1999-0759	8169
75	90 01/10/2006		EXAM	INER
S. H. Dworetsky AT&T Corp, Room 2A-207			FILE, ERIN M	
One AT&T Way			ART UNIT	PAPER NUMBER
Bedminster, NJ 07921			2634	
			DATE MAILED: 01/10/2006	

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
	09/862,755	LI, YE
Office Action Summary	Examiner	Art Unit
	Erin M. File	2634
The MAILING DATE of this communication app Period for Reply	ears on the cover sheet with the c	orrespondence address
A SHORTENED STATUTORY PERIOD FOR REPLY WHICHEVER IS LONGER, FROM THE MAILING DA - Extensions of time may be available under the provisions of 37 CFR 1.13 after SIX (6) MONTHS from the mailing date of this communication. - If NO period for reply is specified above, the maximum statutory period w - Failure to reply within the set or extended period for reply will, by statute, Any reply received by the Office later than three months after the mailing earned patent term adjustment. See 37 CFR 1.704(b).	ATE OF THIS COMMUNICATION 36(a). In no event, however, may a reply be tim vill apply and will expire SIX (6) MONTHS from a cause the application to become ABANDONEI	N. the mailing date of this communication. D (35 U.S.C. § 133).
Status		
1)⊠ Responsive to communication(s) filed on <u>21 Not</u> 2a)□ This action is FINAL . 2b)⊠ This 3)□ Since this application is in condition for allower closed in accordance with the practice under E	action is non-final. nce except for formal matters, pro	
Disposition of Claims		
4) Claim(s) 1-17,21-23,27 and 28 is/are pending i 4a) Of the above claim(s) is/are withdray 5) Claim(s) is/are allowed. 6) Claim(s) 1-17,21,22 and 27 is/are rejected. 7) Claim(s) 23 and 28 is/are objected to. 8) Claim(s) are subject to restriction and/or	vn from consideration.	
	_	
 9) The specification is objected to by the Examine 10) The drawing(s) filed on 21 May 2001 is/are: a) [Applicant may not request that any objection to the Replacement drawing sheet(s) including the correct 11) The oath or declaration is objected to by the Ex 	☐ accepted or b)☐ objected to be drawing(s) be held in abeyance. See ion is required if the drawing(s) is obj	e 37 CFR 1.85(a). jected to. See 37 CFR 1.121(d).
Priority under 35 U.S.C. § 119		
 12) ☐ Acknowledgment is made of a claim for foreign a) ☐ All b) ☐ Some * c) ☐ None of: 1. ☐ Certified copies of the priority documents 2. ☐ Certified copies of the priority documents 3. ☐ Copies of the certified copies of the priority application from the International Bureau * See the attached detailed Office action for a list 	s have been received. s have been received in Application rity documents have been receive u (PCT Rule 17.2(a)).	on No ed in this National Stage
Attachment(s) 1) Notice of References Cited (PTO-892) 2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date	4) Interview Summary Paper No(s)/Mail Da 5) Notice of Informal P 6) Other:	

Art Unit: 2634

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Okawa.

Claim 1, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero. Okawa discloses that the one or more second sets of pilot symbols are based upon the first pilot signal by disclosing the same pilot symbols can be used in common (col. 6, lines 23, 24). Because a cross correlation can be made between transmitted pilot symbols, there must be at least two sets of pilot symbols being transmitted. Further Okawa does not disclose the use of matrix inversion for performing channel estimation.

Art Unit: 2634

Claim 2, Although Okawa does not use the term orthogonal frequency division multiplexing (OFDM), an OFDM carrier signal is the sum of a number of orthogonal subcarriers, with baseband data on each sub-carrier being independently modulated (Wikipedia). Okawa discloses a sum of carriers (fig. 5, 14), which are independently modulated (fig. 5, 12) and spread (fig. 5, 13) with orthogonal spreading codes (col. 3, 21-27).

Claim 3, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero.

Claim 4, Okawa discloses the cross correlation between pilot symbols inserted into channels is zero (abstract). From this it can be reasonably assumed that each cross-correlation estimate between every two sets of training symbols of the one or more sets of second training symbols is essentially zero.

Claims 5, 6, Okawa discloses that the pilot symbols are identical (col. 3, lines 21-22) and are shifted in their transmission position in uniform intervals (col. 8, lines 23-26).

Art Unit: 2634

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United

States.

4. Claims 1, 7, 21, 22 rejected under 35 U.S.C. 102(b) as being anticipated by

Lundby et al.

Claims 1, 7, 21, Lundby discloses a first transmit device that transmits a set of first

training symbols (fig. 2, 4) and a second transmit device that transmits a set of second

training symbols (fig. 2, 6, also see col. 4, lines 28-31). Further Lundby discloses that a

common pilot signal is transmitted from the two separate transmitters 4 and 6, meeting

the limitation of a second training sequence based upon the first training sequence (col/

4, lines 28-30). Further Lundby states that the pilot channels are spread by Walsh

sequences (col. 5, lines 32-33). Lundby further states that the cross-correlation of two

orthogonal sequences is zero (col. 2, lines 36-38). Walsh sequences are orthogonal

sequences, and therefore the pilot symbols spread by Walsh sequences are orthogonal.

Further, Lundby does not disclose the use of matrix inversion for estimation purposes.

Art Unit: 2634

Claim 22, further Lundby discloses the use of a common pilot symbol with transmit diversity (col. 4, lines 28-31), which will inherently introduce phase shift.

Claim Rejections - 35 USC § 103

- 5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
- 6. Claims 10-16, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okawa.

Claims 10, 27, although Okawa does not disclose the receiving one or more sets of second training symbols and characterizing two or more communication channels based on the set of first training symbols and the one or more second sets of training symbols wherein a cross-correlation estimate between the set of first training symbols and at least one of the sets of second training symbols is essentially zero. Okawa discloses the transmission of these first and second pilot symbols on first and second channels with a cross correlation of essentially zero (see Claim 1 paragraph 2 above), it

Art Unit: 2634

can be reasonably inferred that the reception of transmitted signals would be obvious to one skilled in the art at the time of invention.

Claim 11, Okawa further discloses that the pilot symbols are transmitted using direct sequence code division multiple access (DS-CDMA), a type of orthogonal frequency division multiplexing (title).

Claim 12, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero.

Claim 13, As Okawa discloses the cross correlation between pilot symbols inserted into channels is zero (abstract), it can be reasonably assumed that each cross-correlation estimate between every two sets of training symbols of the one or more sets of second training symbols is essentially zero.

Claims 14, 15, Okawa discloses that the pilot symbols are identical (col. 3, lines 21-22) and are shifted in their transmission position in uniform intervals (col. 8, lines 23-26).

Claim 16, Okawa does not disclose the use of matrix inversion in channel estimation.

Art Unit: 2634

7. Claims 8-10, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Lundby.

Claims 8, 10, 17, although Lundby does not disclose the receiving a set of first training

symbols; receiving one or more sets of second training symbols; and characterizing two

or more communication channels based on the set of first training symbols and the one

or more second sets of training symbols; wherein a cross-correlation estimate between

the set of first training symbols and at least one of the sets of second training symbols is

essentially zero, as Lundby discloses the transmission of these first and second pilot

symbols with a cross correlation of essentially zero, it can be reasonably inferred that

the reception of these transmitted signals would be obvious to one skilled in the art at

the time of invention.

Claim 9, further Okawa does not disclose characterizing the two or more

communication channels using a matrix inversion.

Allowable Subject Matter

Art Unit: 2634

8. Claims 23 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571)272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin IVI. File

CHIEH M. FAN SUPERVISORY PATENT EXAMINER

Chiel M